

REMARKS

In view of the above amendment, Applicant believes that pending application is in condition for allowance.

Claims 26-50 are pending, with claims 1-25 cancelled and claims 26-50 added by the present amendment.

In the Office Action, the Specification was objected to; claims 14 and 15 were rejected under 35 U.S.C. § 112, first paragraph; claims 14 and 15 were rejected under 35 U.S.C. § 112, second paragraph; claims 1, 4, 6, 7, 9 and 16 were rejected under 35 U.S.C. § 102(b) as being anticipated by Okumura (U.S. Patent No. 6,370,176); claims 2 and 3 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Okumura in view of Uchida ("Journal of Electronic Material: *Photoluminescence characteristics and pit formation of InGaN/GaN Quantum-Well Structures Grown on Sapphire Substrates by Low-Pressure Metalorganic Vapor Phase Epitaxy*", hereinafter Uchida); claim 5 was rejected under 35 U.S.C. § 103(a) as being unpatentable over Okumura in view of Kim et al. ("Mat. Res. Soc. Symp. Proc. Vol. 722 Materials Research Society: *Structural and Optical Properties of InGaN/GaN Multi-Quantum Well Structures with Different Well Widths*", hereinafter Kim); claims 8, 12 and 13 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Okumura in view of Uchida; claims 10, 11, 14 and 15 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Okumura in view of Kozaki et al. (U.S. Patent No. 6,711,191, hereinafter Kozaki); and claims 17-25 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Okumura in view of Kozaki.

Claims 1-25 are cancelled without prejudice or disclaimer. Page 8 of the Specification is amended in response to the outstanding objection. In response to the outstanding rejection of

claims 14 and 15 under 35 U.S.C. § 112, first paragraph, page 7 of the Specification is amended to correct a grammatical error. Support for the amendment to page 7 of the Specification is found in original claims 14-15. No new matter is added.

Briefly recapitulating, new Claim 26 is directed to:

A light emitting device comprising:

a first gallium nitride layer;

a second gallium nitride layer formed over the first gallium nitride layer;

an active layer having an InGaN/InGaN structure of a multi-quantum well structure formed between the first gallium nitride layer and the second gallium nitride layer; and

an $In_xGa_{1-x}N/In_yGa_{1-y}N$ multi-layer formed between the first gallium nitride layer and the active layer to intercept an applied electrostatic discharge,

wherein *In content with respect to Ga and In content of the active layer is greater than In content with respect to Ga and In content of the $In_xGa_{1-x}N/In_yGa_{1-y}N$ multi-layer.*

Independent Claim 42 recites that the active layer is grown at a temperature lower than the first and second temperatures. With Applicant's claimed invention, improved luminance and reliability is achieved.¹

Applicant acknowledges that the specification does not explicitly state that the In content with respect to Ga and In content of the active layer is greater than In content with respect to Ga and In content of the $In_xGa_{1-x}N/In_yGa_{1-y}N$ multi-layer. However, the specification clearly describes that the active layer is grown at a temperature lower than the growth temperatures of the $In_xGa_{1-x}N/In_yGa_{1-y}N$ multi-layer.² Also, as noted in Applicant's specification, a layer

¹ Specification, page 4, line 30 – page 5, line 9.

² Specification, page 8, lines 4-9, which describes that the active layer may be grown at about 600 to about 800°C, whereas page 6, lines 18-25 describes that the multilayers are grown at temperatures of 900 and 800 °C.

contains less In when it is grown at a higher temperature.³ Thus, new claim 26 contains no new matter.

FIG. 1 of Okumura is a cross-sectional view of a GaN group semiconductor laser device.

In FIG. 1, the GaN group semiconductor laser device includes a sapphire substrate 1, a GaN buffer layer 2, an n-type GaN contact layer 3, an n-type $In_{0.2}Ga_{0.8}N$ light absorption layer 4, an n-type $Al_{0.1}Ga_{0.9}N$ cladding layer 5, an n-type GaN guide layer 6, an active layer 7 of a multi-quantum well (MQW) structure composed of three $In_{0.15}Ga_{0.85}N$ quantum well layers and two $In_{0.03}Ga_{0.97}N$ barrier layers, an $Al_{0.2}Ga_{0.8}N$ evaporation prevention layer 8, a p-type GaN guide layer 9, a p-type $Al_{0.1}Ga_{0.9}N$ cladding layer 10, a p-type GaN contact layer 11, a p-side electrode 12, an n-side electrode 13, and an SiO_2 insulating film 14.

However, Okumura does not disclose or suggest Applicant's claimed feature of the In content with respect to Ga and In content of the active layer being ***greater than*** In content with respect to Ga and In content of the $In_xGa_{1-x}N/In_yGa_{1-y}N$ multi-layer. Okumura only describes that the In content with respect to Ga and In content of the active layer is ***less than*** In content with respect to Ga and In content of the $In_xGa_{1-x}N/In_yGa_{1-y}N$ multi-layer.⁴ Similarly, Okumura does not disclose that the active layer is grown at a temperature lower than the first and second temperatures, as recited in Applicant's new claim 42.

MPEP § 2131 notes that “[a] claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference.” *Verdegaal Bros. v. Union Oil Co. of California*, 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987). See also MPEP § 2131.02. “The identical invention must be shown in as

³ Specification, page 7, lines 6-17.

⁴ Okumura, column 11, lines 8-14.

complete detail as is contained in the ... claim.” *Richardson v. Suzuki Motor Co.*, 868 F.2d 1226, 1236, 9 USPQ2d 1913, 1920 (Fed. Cir. 1989). Because Okumura does not disclose or suggest all of the features recited in Claims 26 and 42, Okumura does not anticipate the invention recited in Claims 26 and 42, and all claims depending therefrom.

Applicant has considered the remaining references and submits that the remaining references do not cure the deficiencies of Okumura. As none of the cited prior art, individually or in combination, discloses or suggests all the elements of independent Claims 26 and 42, the inventions defined by Claims 26 and 42, and all claims depending therefrom, are not rendered obvious by the asserted references for at least the reasons stated above.⁵

Regarding dependent claims 27, 40 and 50, the cited references fail to teach or suggest that the active layer is directly formed on the $\text{In}_x\text{Ga}_{1-x}\text{N}/\text{In}_y\text{Ga}_{1-y}\text{N}$ multi-layer. Thus, for independent reasons, claims 27, 40 and 50 are not anticipated, nor rendered obvious, by the applied references.

Regarding dependent claims 28, 35 and 45, the cited references fail to teach or suggest that the $\text{In}_x\text{Ga}_{1-x}\text{N}/\text{In}_y\text{Ga}_{1-y}\text{N}$ multi-layer has a plurality of pits formed thereon. That is, Uchida teaches merely pit formation of InGaN/GaN quantum-well structures (active layer), not a plurality of pits formed on the $\text{In}_x\text{Ga}_{1-x}\text{N}/\text{In}_y\text{Ga}_{1-y}\text{N}$ multi-layer below the active layer. Thus, for independent reasons, claims 28, 35 and 45 are not anticipated, nor rendered obvious, by the applied references.

Regarding dependent claims 30, 37 and 47, the cited references fail to teach or suggest that the $\text{In}_x\text{Ga}_{1-x}\text{N}/\text{In}_y\text{Ga}_{1-y}\text{N}$ multi-layer is formed to have a super lattice structure. Thus, for

⁵ MPEP § 2142 “...the prior art reference (or references when combined) must teach or suggest all the claim limitations.

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independent reasons, claims 30, 37 and 47 are not anticipated, nor rendered obvious, by the applied references.

Independent claim 33 is directed to

A light emitting diode (LED), comprising:

a first gallium nitride layer;

an $\text{In}_x\text{Ga}_{1-x}\text{N}/\text{In}_y\text{Ga}_{1-y}\text{N}$ multi-layer formed over the first gallium nitride layer;

an active layer formed over the $\text{In}_x\text{Ga}_{1-x}\text{N}/\text{In}_y\text{Ga}_{1-y}\text{N}$ multi-layer; and

a second gallium nitride layer formed over the active layer.

Independent claim 33 and dependent claims 34-41 are directly related to a light emitting diode (LED). However, the relevant applied references (Kozaki and Okumura) disclose merely a laser device. One skilled in the art knows that a LED is different from a laser device, particularly a laser used as a light source in a device such as DVD device. Thus, for independent reasons, claims 33-41 are not anticipated, nor rendered obvious, by the applied references.

CONCLUSION

All of the stated grounds of rejection have been properly traversed, accommodated, or rendered moot. Applicant therefore respectfully requests that the Examiner reconsider all presently outstanding rejections and that they be withdrawn. It is believed that a full and complete response has been made to the outstanding Office Action, and as such, the present application is in condition for allowance.

Should there be any outstanding matters that need to be resolved in the present application, the Examiner is respectfully requested to contact Michael Monaco, Reg. No. 52,041, at the telephone number below to conduct an interview in an effort to expedite prosecution in connection with the present application.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies to charge payment or credit any overpayment to Deposit Account No. 02-2448 for any additional fees required under 37.C.F.R. §§ 1.16 or 1.14; particularly, extension of time fees.

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Respectfully submitted,

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